BROOKHAVEN NATIONAL LABORATORY

Work Permit # _____
Work Order # _____
Job# _____ **Activity#** _____

1. Work requester fills out this section. ☐ **Standing Work Permit**

Requester: Don Lynch	Date: 7/20/2007	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Jim LaBounty			Ext.: 3774
Work Control Coordinator: Don Lynch		Start Date: 1/12/2006	Est. End Date: 9/30/2007
Brief Description of Work: Repair/upgradeMPC South & North Detectors in MMS & MMN piston cavities			
Building: 1008	Room: IR	Equipment: MPC	Service Provider: PHENIX

2. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis

ES&H ANALYSIS				
Radiation Concerns	☒ None	☐ Activation	☐ Airborne	☐ Contamination	☐ Radiation
Radiation Generating Devices:	☐ Radiography	☐ Moisture Density Gauges	☐ Soil Density Gauges	☐ X-ray Equipment
☐ Special nuclear materials involved, notify Isotope Special Materials Group			☐ Fissionable materials involved, notify Laboratory Criticality Officer	
Safety Concerns	☐ None	☐ Ergonomics	☐ Transport of Haz/Rad Material	
☐ Adding/Removing Walls or Roofs	☐ Confined Space*	☐ Explosives	☐ Lead*	☐ Penetrating Fire Walls
	☐ Corrosive	☐ Flammable	☐ Magnetic Field*	☐ Pressurized Systems
☐ Asbestos*	☐ Cryogenic	☐ Fumes/Mist/Dust*	☐ Material Handling	☐ Rigging/Critical Lift
☐ Beryllium*	☐ Electrical	☐ Heat/Cold Stress	☐ Noise*	☐ Toxic Materials*
☐ Biohazard*	☒ Elevated Work*	☐ Hydraulic	☐ Non-ionizing Radiation*	☐ Vacuum
☐ Chemicals*	☐ Excavation	☐ Lasers*	☐ Oxygen Deficiency*	☒ Other: Working near beampipe
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? ☐ Yes ☒ No				
Environmental Concerns		☒ None	☐ Work impacts Environmental Permit No.	
☐ Atmospheric Discharges (rad/non-rad)		☐ Land Use	☐ Soil Activation/contamination	☐ Waste-Mixed
☐ Chemical or Rad Material Storage or Use		☐ Liquid Discharges	☐ Waste-Clean	☐ Waste-Radioactive
☐ Cesspools (UIC)		☐ Oil/PCB Management	☐ Waste-Hazardous	☐ Waste-Regulated Medical
☐ High water/power consumption		☐ Spill potential	☐ Waste-Industrial	☐ Underground Duct/Piping
Waste disposition by:				☐ Other
Pollution Prevention (P2)/Waste Minimization Opportunity:		☒ None ☐ Yes		
FACILITY CONCERNS	☒ None			
☐ Access/Egress Limitations	☐ Electrical Noise	☐ Potential to Cause a False Alarm		☐ Vibrations
	☐ Impacts Facility Use Agreement		☐ Temperature Change	☐ Other
☐ Configuration Control	☐ Maintenance Work on Ventilation Systems		☐ Utility Interruptions	
WORK CONTROLS				
Work Practices				
☐ None	☐ Exhaust Ventilation	☐ Lockout/Tagout	☐ Spill Containment	☐ Security (see Instruction Sheet)
☐ Back-up Person/Watch	☐ HP Coverage	☐ Posting/Warning Signs	☐ Time Limitation	☐ Other
☐ Barricades	☐ IH Survey	☐ Scaffolding-requires inspection	☐ Warning Alarm (i.e. “high level”)	
Protective Equipment				
☐ None	☐ Ear Plugs	☐ Gloves	☐ Lab Coat	☐ Safety Glasses
☐ Coveralls	☐ Ear Muffs	☐ Goggles	☐ Respirator	☐ Safety Harness
☐ Disposable Clothing	☐ Face Shield	☒ Hard Hat	☐ Shoe Covers	☐ Safety Shoes ☐ Other
Permits Required (Permits must be valid when job is scheduled.)				
☒ None	☐ Cutting/Welding	☐ Impair Fire Protection Systems		
☐ Concrete/Masonry Penetration	☐ Digging/Core Drilling	☐ Rad Work Permit-RWP No		
☐ Confined Space Entry	☐ Electrical Working Hot	☐ Other		
Dosimetry/Monitoring				
☒ None	☐ Heat Stress Monitor	☐ Real Time Monitor	☐ TLD	
☐ Air Effluent	☐ Noise Survey/Dosimeter	☐ Self-reading Pencil Dosimeter	☐ Waste Characterization	
☐ Ground Water	☐ O_2/Combustible Gas	☐ Self-reading Digital Dosimeter	☐ Other	
☐ Liquid Effluent	☐ Passive Vapor Monitor	☐ Sorbent Tube/Filter Pump		
Training Requirements (List below specific training requirements)				
Working at Heights, PHENIX Awareness, Fall protection				
Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:			**If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)**	
ES&H Risk Level:	☒ Low ☐ Moderate ☐ High		WCC:	Date:
Complexity Level:	☒ Low ☐ Moderate ☐ High		Service Provider:	Date:
Work Coordination:	☒ Low ☐ Moderate ☐ High		Authorization to start	Date:
			(Departmental Sup/WCC/Designee)	

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, and personnel availability need to be addressed): See attached procedure
Special Working Conditions Required: None
Operational Limits Imposed: None
Post Work Testing Required: No

Job Safety Analysis Required: ☐ Yes ☒ No	Walkdown Required: ☒ Yes ☐ No

Reviewed by: Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.

Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Other				
Other				
Work Control Coordinator	Don Lynch			
Service Provider				
	Review Done: ☐ in series	☐ team		

4. Job site personnel fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

5. Departmental Job Supervisor, Work Control Coordinator/Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required. ☐ Yes ☐ No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

7. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)
a) WCM/WCC: Is any feedback required? ☐ Yes ☐ No

b) Workers: Are there better methods or safer ways to perform this job in the future? ☐ Yes ☐ No

8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)

Name:	Signature:	Life#:	Date:
Comments:			

Work plan Attachment **WP# _____**

MPC South Detector Repairs
PHENIX IR, Bldg. 1008

Discussion

The MPC South detector was successfully installed in the MMS piston cavity just prior to run 6 of the RHIC accelerator. Although, the operation of this detector was highly successful during this run, there was less than optimal performance by a few of the crystals. In addition, the installation of the upper modules was modified to accommodate out of tolerance modules (which in turn were due to out of tolerance wrapped crystals.) During the run, design work on the crystal wrap and module enclosure mechanical construction for the MPC North developed improved methods for wrapping crystals and assembling the modules. Some of these improvements will be retrofitted into the MPC South.

In addition, the LED test circuits built into both the MPC North and MPC South will be upgraded to provide a more efficient and effective test circuit.

This work is to be done by fully trained and experienced PHENIX personnel, under the technical supervision of Jim LaBounty and the engineering cognizance of Don Lynch (mechanical) and John Haggerty (electrical). The actual mechanical and electrical work requires mechanical/electrical technician skill of the craft to perform.

All persons involved will have appropriate training for working at heights, fall protection and all other relevant training.

Procedure

Caution: During all phases of the work described herein, maintain extreme care at all times to prevent contact with the beam pipe.

1. LOTO the power to the MMN/MMS magnet coil at the power supply in1008B. (Pearson)

2. Assure that the CM is locked in its run position by locking out the hydraulics to each magnet mover. (LaBounty**)**

3. Assure that all power to the detector is locked out (Haggerty)

4. Carefully remove the signal and power cables

   Note: Only PHENIX technicians fully trained and approved for this operation by the cognizant engineers and technical supervisor may operate the articulated

arm man lift. A maximum of 2 people may perform the following work in the manlift bucket and a third person shall be in the PHENIX IR, aware of the work being performed, and within communication distance at all times. The passenger in the manlift shall be fully trained as indicated above and shall be approved for this work by the cognizant engineers and technical supervisor.

5. Using the articulated arm manlift, carefully driven to avoid any possibility of contact with adjacent detector components or the beampipe to access the MMS piston cavity.

6. Disassemble the individual modules requiring repairs, remove/repair/replace/ upgrade components as necessary and re-integrate the modules into a single detector system.

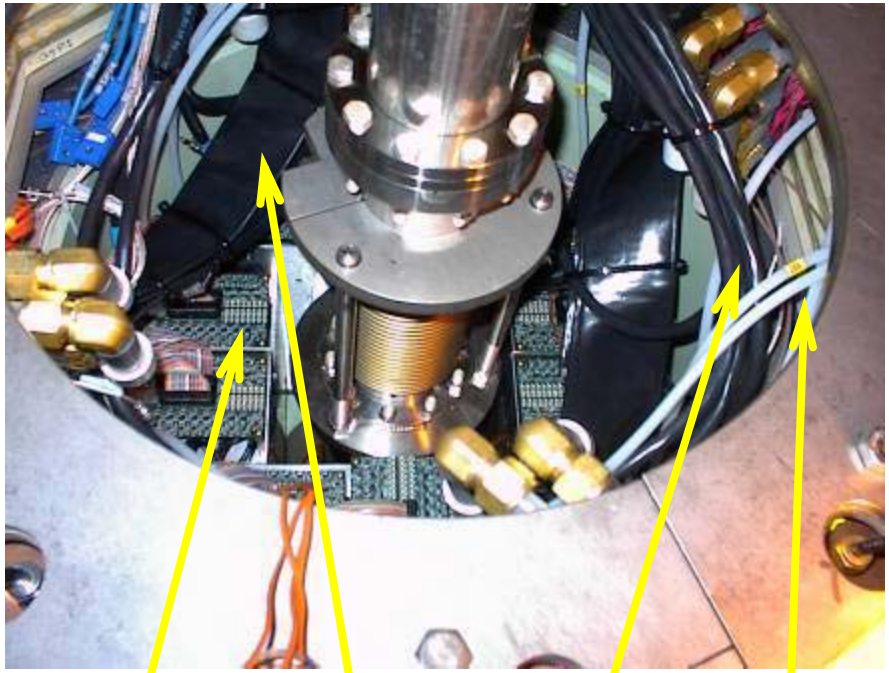
7. Align the system to its ultimate position and anchor the assembly at that position.

8. After re-installing, integrating, positioning and aligning the assembly make sure that all tools and any other foreign matter are removed from the piston hole.

9. Re-attach signal and power cables as required and route them into the provided cable tray to the MPC South electronics crate.

At this point detector re-commissioning may commence.

MPC South Repairs

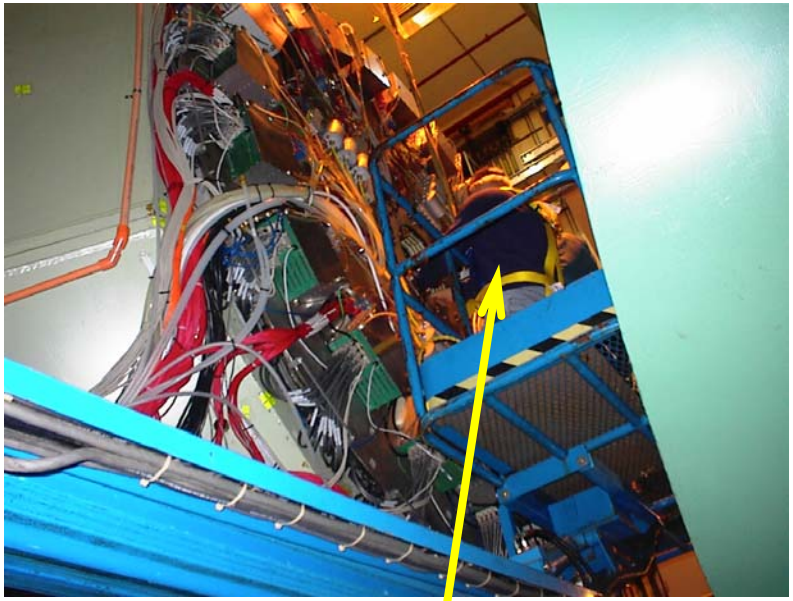


Modules

Signal Cables

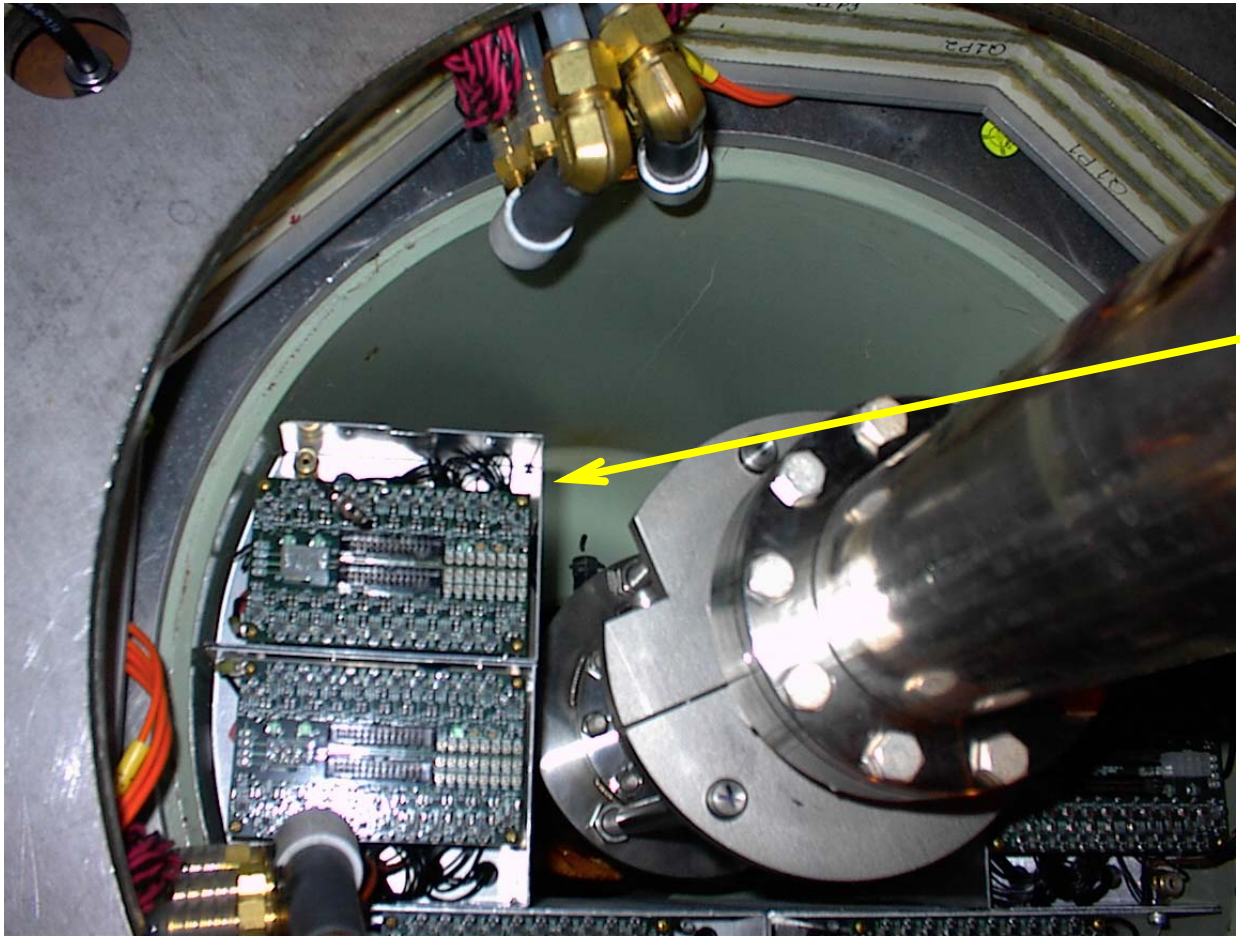
Power cables

Dry air supply



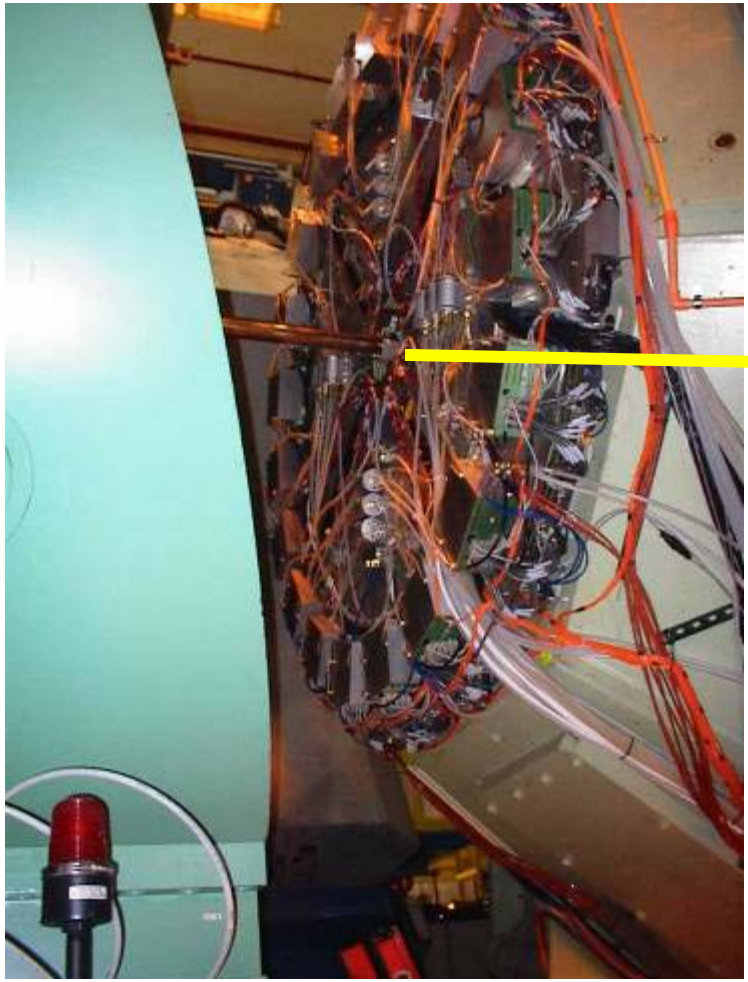
Working on Manlift to Service MPC South

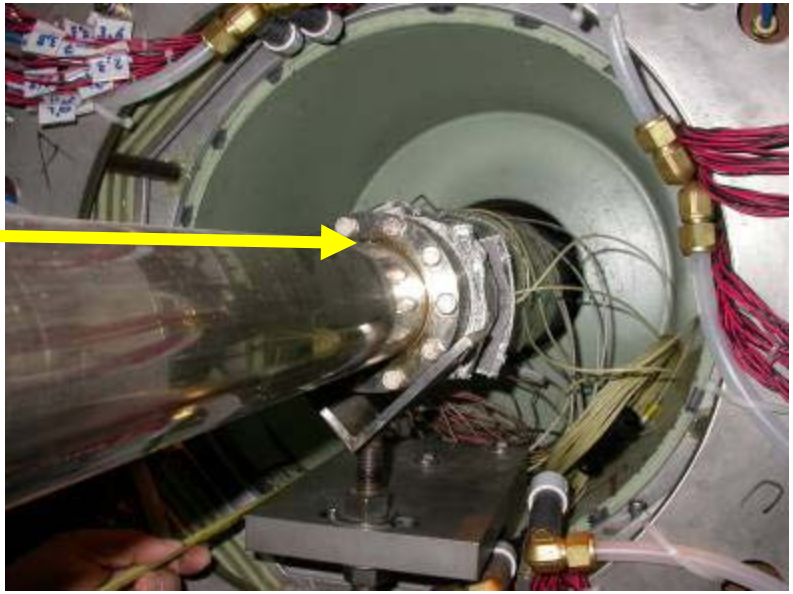
MPC South Repairs

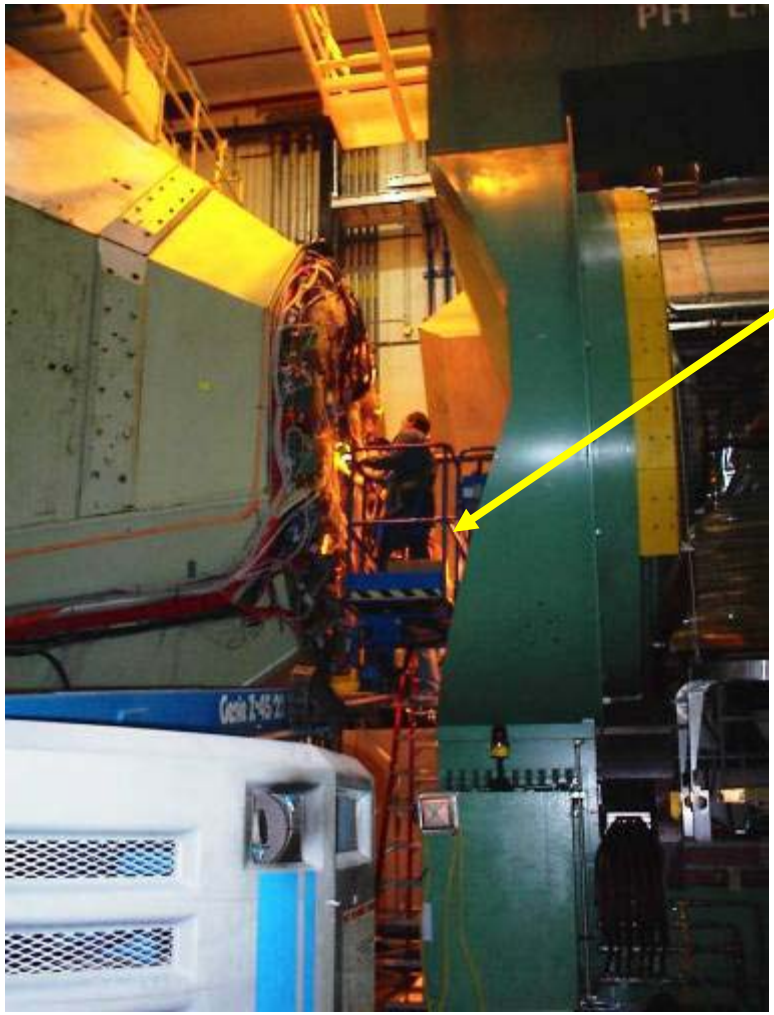


MPC South with cables, dry air supply and 2 upper modules removed

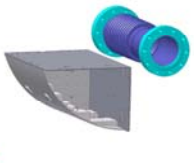
MPC North is installed in the Muon Magnet North piston cavity







MPC North to be serviced from man lift, as South version was.



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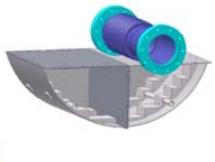

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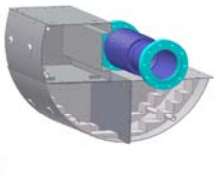

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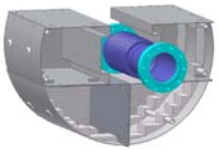

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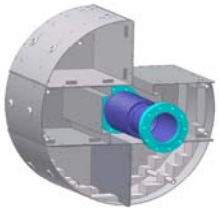

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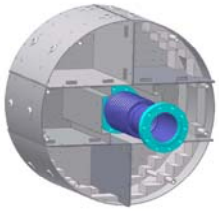

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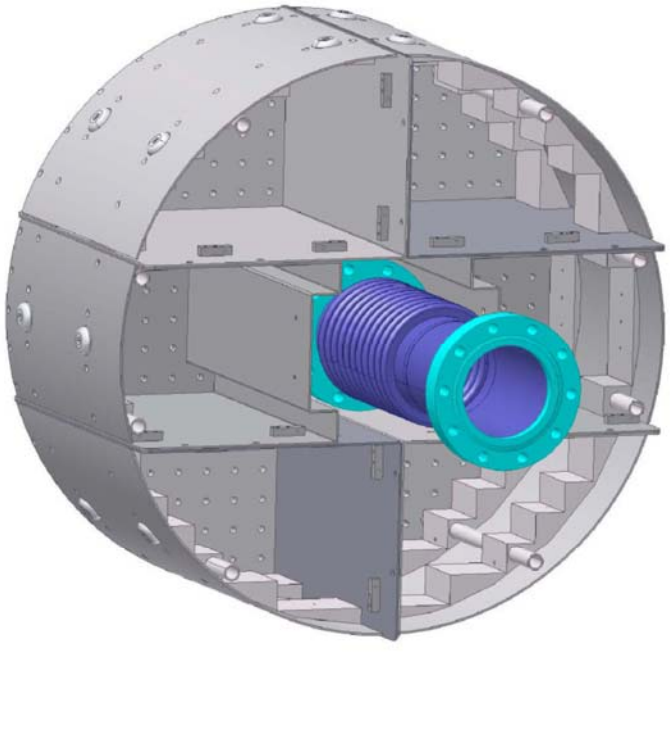
Empty sextants are removed first. LED's and LED board are upgraded tested and reinstalled.

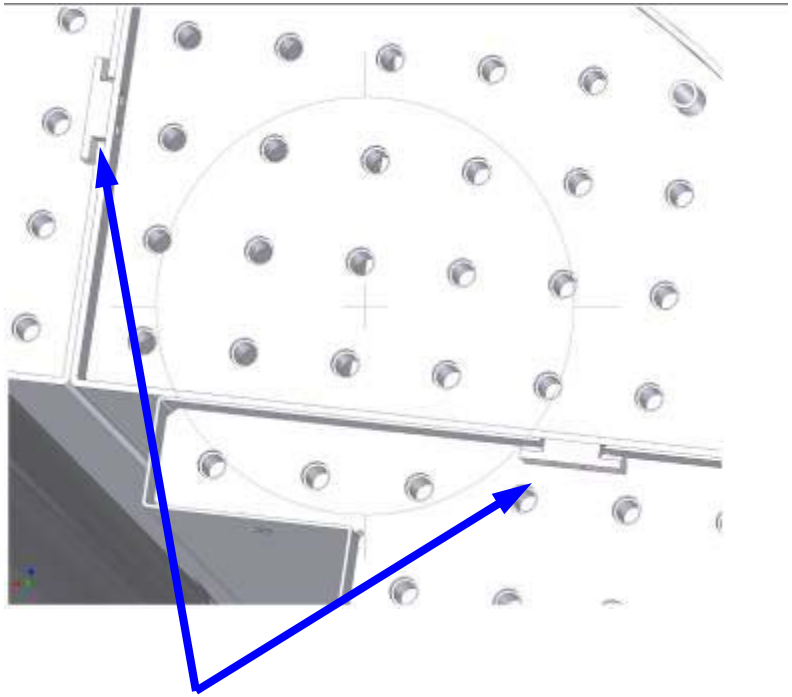
Then modules are individually inserted.

Next APD cable is attached then snaked through cover which is attached.

Finally, standoffs and signal pcbs are attached, wired and routed to MPC N rack.

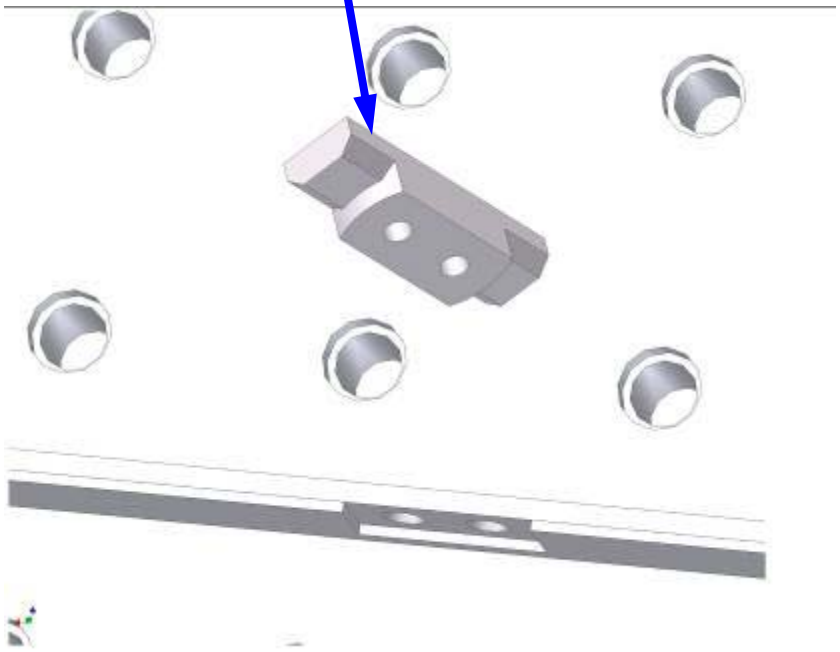


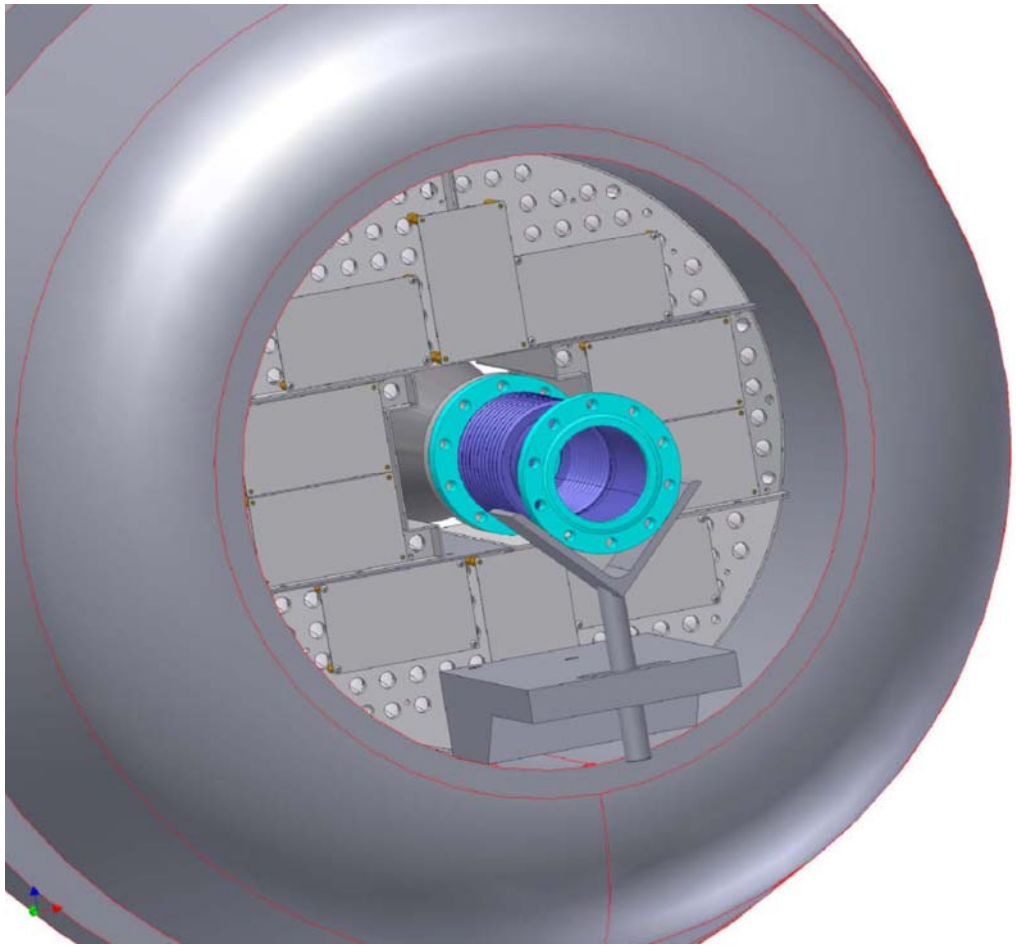
All of the empty sectors are installed before the crystals are inserted



Modules interconnect at rear using tabs as in MPC S

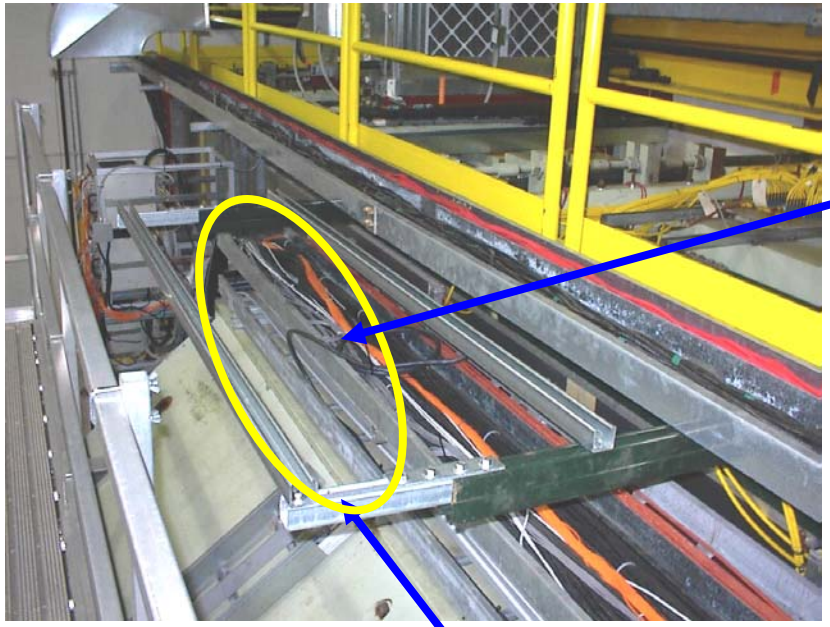
Tabs for MPC N modified for increase clearance and rounded for easy locating and self centering

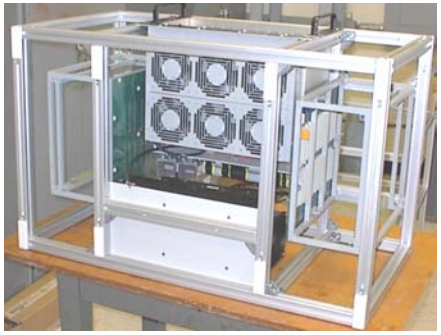




MPC North mechanical assembly complete ready for cabling

MPC North Cable Routing



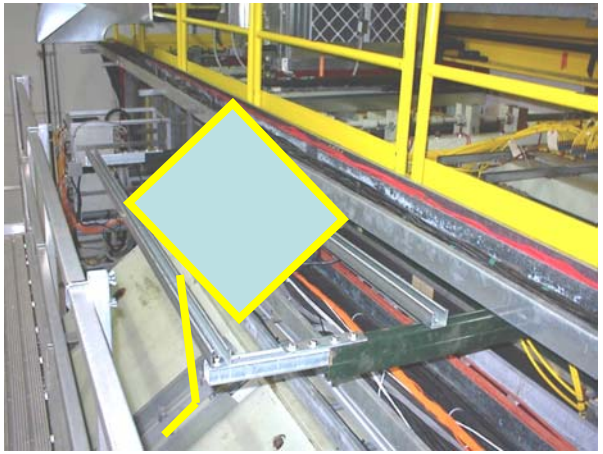


MPC North Crate

Unistrut Crate Support

MPC North Cable Routing

1



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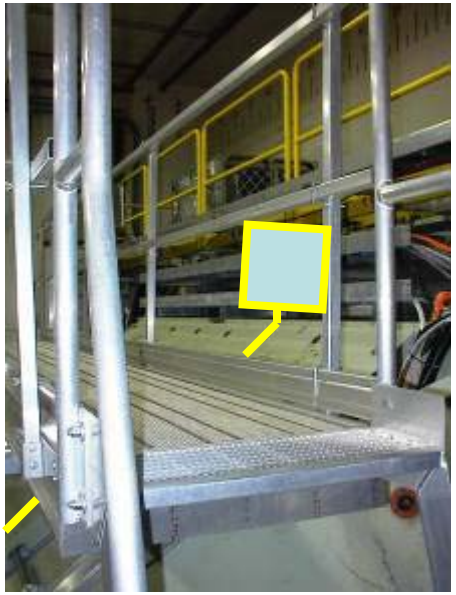

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1. Crate supported on unistrut west of north crossover
2. Cables routed to tray under north crossover platform
3. Cables routed in tray mounted to MMN top lampshade
4. Cables run down from top of station 1 into Piston Cavity and connect to MPC driver boards

4